

## CLAIMS

1. An active capacitor regulating type controllable voltage and current power supply circuit is disclosed with a voltage reducing and current limiting rectifying circuit which is constituted by capacitors and a bridge type current rectifier device, wherein it is characterized in that the output terminals of the rectifying circuit are parallel installed with a current distributing circuit device, thereby to actively control the output voltage setting status, wherein it is mainly comprised of the following:
- An AC power Source 100: It is a single phase or multiple phase power source coming from city power or from the secondary AC power source of transformer;
  - An active capacitor 101: It is constituted by all kinds of capacitors 101 suitable for application with AC power, thereof it can be directly series combined between the AC power source 100 and the current rectifier device 103 or can be series combined between the AC power source 100 and the primary terminals of transformer 102; or can be series combined between the secondary terminals of transformer 102 and current rectifier device 103; wherein the two end terminals of capacitor 101 can be further parallel combined with relieving resistor R101;
  - A transformer 102: The transformer 102 is installed between the AC power source 100 and current rectifier device 103 for changing the voltage value of the AC power source 100, wherein it is comprised

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of an isolated type structure with primary and secondary isolated windings or a self-coupled transformer structure with self-coupled windings, whereof its secondary output windings can be a three terminals type secondary windings with intermediate extractions or the two terminals type secondary windings; whereof the transformer 102 is a selective device which can be installed if required by the circuit, and the active capacitor 101 can be series combined between the primary terminals or secondary terminals of the transformer 102, or the transformer 102 can be omitted instead while the AC power source 100 and the active capacitor 101 is directly series combined before providing input to the current rectifier device 103;

- A current rectifier device 103: It is a full wave bridge type current rectifier device comprised of solid state rectifiers for converting input AC power into full wave DC output;
- A first wave filter capacitor 104: It is parallel combined between the output positive and negative terminals of the current rectifier device 103 whereby to reduce voltage pulsation, wherein the capacitor can be selected to be installed or not installed;
- A controllable current distributing device 105: It is constituted by a linear or switching type solid state or electromechanical components or thyristors, wherein it is parallel combined between the output terminals of the current rectifier device 103 to

generate linear or switching type current distributing functions at load decrease or output voltage increase of current rectifier 103 due to rising power source terminal voltage, thereby to maintain a stable output voltage;

- An output voltage control device 106: It is comprised of electromechanical or solid state components for controlling the operating status of the controllable current distributing device 105, and further to control the output terminal voltage of the active capacitor regulating type controllable voltage and current power supply circuit; wherein it is comprised of : 1) the current limiting resistor R110 and zener diode ZD110 are series combined and are then parallel combined between the power source and control terminal of the controllable current distributing device thereby to constitute a voltage output control device with a fixed bias; 2) the fixed voltage distributing resistors R111, R112 are parallel combined between the two terminals of power source, while a zener diode ZD110 can be series combined between its extraction terminal and the controllable current distributing device thereby to constitute a voltage output control device with a proportional bias; 3) a variable resistor VR110 can be parallel combined between the two terminals of power source, while a zener diode ZD110 can be series combined between the output terminal of the variable resistor and the controllable current distributing device thereby to constitute a voltage

output control device with a controllable bias; 4) the voltage output control device comprising of the pulse-width modulation functioning output voltage control device CL110 is used to perform PWM control the controllable current distributing device; 5) the voltage output control device is constituted by a phase angle triggering modulation circuit;

- A isolating diode 107: it is for series combined between the power source output terminal leading to the second wave filter capacitor 108 and further to the load 109, thereby to prevent the accumulated power at the second wave filter capacitor 108 from flowing back to the power source; therein the isolating diode 107 can be selected to be installed or not installed according to circuit requirement;
- A second wave filter capacitor 108: it is parallel combined between the circuit output terminals leading to the load for further reducing the voltage pulsation, wherein the capacitor can be selected to be installed or not installed;
- A load 109: it is a resistive load or resistive and inductive mixing type load or rechargeable and accumulative type load or rotational electrical machine type load for matching with the active capacitor regulating type controllable voltage and current power supply circuit;
- The active capacitor regulating type controllable voltage and current power supply circuit can be installed with various type overload or short circuit protecting components such as safe fuse,

circuit breaker and various surge voltage absorbing protective components as well as various noise absorbing components;

- 5     • A load terminal voltage detector device 110: it is coupled between the two terminals of load 109 for transferring the detected voltage feedback signal to the output voltage control device 106 thereby to provide voltage feedback control function on the controllable current distributing device, whereof  
10     the load terminal voltage detector device is comprised of electromechanical or solid state circuit components, which can be selected to be installed or not installed;
- 15     • A load current detector device 111: it is series combined between the load 109 and the power source for transferring detected current signal to the voltage output control device 106 thereby to provide current feedback control function on controllable  
20     current distributing device 105, whereof the load current detector device 111 is comprised of electromechanical or solid state circuit components, which can be selected to be installed or not installed;
- 25     • A control interface 112: it is a manual or electromechanical signal control interface comprised of electromechanical or solid state circuit components for controlling the voltage output control device 106 and controllable current  
30     distributing device 105, wherein the control interface 112 can be selected to be installed or not

installed according to system requirements.

2. The active capacitor regulating type controllable voltage and current power supply circuit as in claim 1, wherein it includes that the active capacitor 101 is directly series combined with AC input terminals of the full wave current rectifier device 103.
3. The active capacitor regulating type controllable voltage and current power supply circuit as in claim 1, wherein the active capacitor 101 is series combined with the primary windings of transformer 102, and through the secondary windings of transformer 102 to transfer output to the full wave current rectifier device 103.
4. The active capacitor regulating type controllable voltage and current power supply circuit as in claim 1, wherein the active capacitor 101 is series combined between the secondary winding of the transformer 102 and the current rectifier device 103.
5. The active capacitor regulating type controllable voltage and current power supply circuit as in claim 1, wherein the active capacitor 101 is series combined with the primary winding of the transformer 102 whereby the secondary winding of the transformer 102 with intermediate extractions and two diodes constitute a full wave current rectifier circuit,
6. The active capacitor regulating type controllable voltage and current power supply circuit as in claim 1, wherein three active capacitors 101 are each respectively series combined between the three phase AC power source and the three phase full wave current

rectifier device 103.

- 5 7. The active capacitor regulating type controllable voltage and current power supply circuit as in claim 1, wherein the AC power source transfers output to the three phase transformer 102, whereby three active capacitors 101 are each respectively series combined between the secondary winding of the three phase transformer 102 and the three phase full wave current rectifier device 103.
- 10 8. The active capacitor regulating type controllable voltage and current power supply circuit as in claim 1, wherein the active capacitor 101 is series installed between the single phase power source 100 and the load 109, while the AC terminals of the full current bridge type current rectifier 103 are parallel combined with the two AC output terminals, while the positive and negative terminals of the current rectifier device 103 are parallel combined in current direction with the controllable current distributing device 105 as well as that the output terminals can be selectively series installed with a load current detector device 111 or parallel installed with a load terminal voltage detector device 110 for detecting the relative current or voltage thereby to control the output voltage control device 106 and further to modulate the AC output voltage or current.
- 25 9. The active capacitor regulating type controllable voltage and current power supply circuit as in claim 1, wherein the full wave rectified full wave pulsating DC
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output terminals are directly parallel combined with a controllable current distributing device 105 which is comprised of linear or switching type solid state or electromechanical components or thyristors for accepting control by the voltage output control device 106, in addition, the circuit can be series installed with a diode 107 in the current direction between the controllable current distributing device 105 and the output voltage control device as well as that a second wave filter capacitor 108 can be selectively parallel installed between the output terminals as required.

10. The active capacitor regulating type controllable voltage and current power supply circuit as in claim 1, wherein the full wave rectified DC output terminals are first parallel combined with the first wave filter capacitor 104 and then parallel combined with a controllable current distributing device 105 which is comprised of linear or switching type solid state or electromechanical components or thyristors for accepting control by the voltage output control device, in addition, the aforesaid circuit can be series installed with a diode 107 in the current direction between the controllable current distributing device 105 and the output voltage control device as well as that a second wave filter capacitor 108 can be selectively parallel installed between the output terminals as required.

11. The active capacitor regulating type controllable voltage and current power supply circuit as in claim 1, wherein the controllable current distributing



device 105 comprising of linear or switching type solid state controllable current distributing components or electromechanical components are controlled by a voltage output control device 106 with fixed bias, wherein the fixed bias is obtained including from the series combined zener diode ZD101 (including the further series installed current limiting resistor R110), in addition, the aforesaid circuit can be series installed with a diode 107 in the current direction between the controllable current distributing device 105 and the output voltage control device as well as that a second wave filter capacitor 108 can be selectively parallel installed between the output terminals as required.

12. The active capacitor regulating type controllable voltage and current power supply circuit as in claim 1, wherein the controllable current distributing device 105 comprised of thyristor SCR 110 is controlled by a variable resistor VR110, wherein the controllable voltage bias is obtained by the variable resistor VR110 and the series combined zener diode ZD110 with its output terminals, in addition, the aforesaid circuit can be series installed with a diode 107 in the current direction between the controllable current distributing device 105 and the output voltage control device as well as that a second wave filter capacitor 108 can be selectively parallel installed between the output terminals as required.

13. The active capacitor regulating type controllable

voltage and current power supply circuit as in claim  
1, wherein the voltage output control device 106 is  
constituted by series combining a zener diode ZD110  
between the extraction terminal of the voltage  
distributing resistors R111 and R112 which is  
parallel combined between the two power source  
terminals and the control terminal of the  
controllable current distributing device 105, thereby  
to provide a proportional voltage bias for  
controlling the controllable current distributing  
device 105 comprised of linear or switching type  
solid state or electromechanical components or  
thyristor SCR110, wherein the aforesaid voltage  
distributing resistor includes the constitution by  
other voltage setting permissible circuits. in  
addition, the aforesaid circuit can be series  
installed with a diode 107 in the current direction  
between the controllable current distributing device  
105 and the output voltage control device as well as  
that a second wave filter capacitor 108 can be  
selectively parallel installed between the output  
terminals as required.

14. The active capacitor regulating type controllable  
voltage and current power supply circuit as in claim  
1, wherein the voltage output control device 106 is  
constituted by series combining a zener diode ZD110  
between the output terminal of the variable resistor  
VR110 which is parallel combined between the two  
power source terminals and the input terminal of the  
controllable current distributing device 105, thereby

to provide a fixed voltage bias for controlling the controllable current distributing device 105 comprised of linear or switching type solid state or electromechanical components or thyristors, in addition, the aforesaid circuit can be series installed with a diode 107 in the current direction between the controllable current distributing device 105 and the output voltage control device as well as that a second wave filter capacitor 108 can be selectively parallel installed between the output terminals as required.

15. The active capacitor regulating type controllable voltage and current power supply circuit as in claim 1, wherein the controllable current distributing device 105 comprised of linear or switching type solid state or electromechanical components or thyristors, is controlled by the output voltage control device 106 which is further controlled by the pulse-width modulation functioning voltage output control device CL110 for pulse-width modulation (PWM) control, in addition, the aforesaid circuit can be series installed with a diode 107 in the current direction between the controllable current distributing device 105 and the output voltage control device as well as that a second wave filter capacitor 108 can be selectively parallel installed between the output terminals as required.

16. The active capacitor regulating type controllable voltage and current power supply circuit as in claim 1, wherein the controllable current distributing

device 105 comprised of thyristors can be controlled by a phase angle triggering modulation output voltage control device 106 constituted by the variable resistor VR111, phase shifting capacitor C110, and triggering diode D110, in addition, the aforesaid circuit can be series installed with a diode 107 in the current direction between the controllable current distributing device 105 and the output voltage control device as well as that a second wave filter capacitor 108 can be selectively parallel installed between the output terminals as required.

17. The active capacitor regulating type controllable voltage and current power supply circuit as in claim 1, wherein the DC power source which is parallel combined with the controllable current distributing device 105 is series combined with a isolating diode 107 in current direction thereby to connect the output voltage control device 106 and the load.

18. The active capacitor regulating type controllable voltage and current power supply circuit as in claim 1, wherein the DC power source which is parallel combined with the controllable current distributing device 105 is series combined with a isolating diode 107 in current direction thereby to parallel combined with the output voltage control device 106 and further parallel combined with the second wave filter capacitor 108 to connect the load.

19. The active capacitor regulating type controllable voltage and current power supply circuit as in claim 1, wherein it includes the combinations of the

various functional circuits as in the aforesaid claims 2 to claims 8 and claims 10 to claims 18.

20. The active capacitor regulating type controllable voltage and current power supply circuit as in claim 1, wherein it includes the combination of the various functional circuits as in the aforesaid claims 2 to claims 8 and claims 10 to claim 19, whereof its output terminals are for driving the resistive type or resistive and inductive mixing type or rechargeable battery type DC loads.

21. The active capacitor regulating type controllable voltage and current power supply circuit as in claim 1, wherein the active capacitor 101 is directly series combined between the single phase AC power source 100 and the load 109, while the two AC power output terminals leading to the load 109 are parallel combined with a full wave current rectifier device 103, whereby the positive and negative output terminals of the full wave current rectifier device 103 is further parallel combined with a controllable current distributing device 105 comprised of solid state linear or switching solid state controllable current distributing components in the polar direction, as well as that the output terminals can be selectively series installed with a load current detector device 111 or parallel installed with a load terminal voltage detector device 110 for detecting the relative current or voltage thereby to control the output voltage control device 106 and further to modulate the AC output voltage or current.

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22. The active capacitor regulating type controllable voltage and current power supply circuit as in claim 1, wherein its rear section output circuit can be further relying on rearranging the multi-level series combination type controllable current distributing device to constitute a multiple voltage output circuit, therein the multi-level series combination type controllable current distributing circuit is characterized in that two or more than two linear or switching type solid state or electromechanical components or thyristors are series combined first and are then parallel combined with the output terminals of the front section power source, while each controllable current distributing circuit is individually combined with its matching output control device for its individual control, in addition, the two terminals of the power source and the series connecting point of each controllable current distributing component commonly constitutes the multiple voltage extractions thereby to individually provide output to drive the individual load.
23. The active capacitor regulating type controllable voltage and current power supply circuit as in claim 22, wherein its multiple voltages output circuit is comprised of that a front section current rectifying circuit with full wave rectified current function is installed, while the two controllable current distributing circuits 105 comprised of two linear or switching type solid state or electromechanical

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components are first series combined in polarity direction, then are parallel combined with the power source, therein each circuit is respectively coupled with each individual output control device 106, thereby the multiple voltage extractions are constituted by the series combining point between the aforesaid two controllable current distributing circuits and the positive or negative power source for individual outputs to drive the individual load, in addition, each of the two aforesaid circuits can be series installed with a diode 107 in the current direction between the controllable current distributing device 105 and the output voltage control device as well as that a second wave filter capacitor 108 can be selectively parallel installed between the output terminals as required.

24. The active capacitor regulating type controllable voltage and current power supply circuit as in claim 22, wherein its multiple voltages output circuit is comprised of that a front section current rectifying circuit with full wave rectified current function is installed, while the two controllable current distributing circuits 105 comprised of two thyristors SCR110 are first series combined in polar direction and then are parallel combined with the power source, and each circuit is respectively coupled with each individual output control device 106, thereby the multiple voltage extractions are constituted by the series combining point between the aforesaid two controllable current distributing circuits and the

positive or negative power source for individual outputs to drive the individual load, in addition, each of the two aforesaid circuits can be series installed with a diode 107 in the current direction between the controllable current distributing device 105 and the output voltage control device as well as that a second wave filter capacitor 108 can be selectively parallel installed between the output terminals as required.

25. The active capacitor regulating type controllable voltage and current power supply circuit as in claim 22, wherein its multiple voltage extractions output circuit is comprised of that the active capacitor 101 is series combined with the AC power source 100, whereby the AC terminals of the two full wave bridge type current rectifying device 103 are mutually series combined and then are parallel combined with the output terminals of the AC power source 100, while each of the two linear or switching type solid state or electromechanical components is connected to the positive and negative terminals of the individual bridge type current rectifier device 103 in polar direction, thereby to constitute the controllable current distributing device 105, therein the output terminals can be selectively series installed with a load current detector device 111 or parallel installed with a load terminal voltage detector device 110 for detecting the relative current or voltage thereby to further control the output voltage control device 106 and the series combining points of



the aforesaid two full wave current rectifier device 103 and the two AC power source terminals constitute multiple AC output voltage or current extractions.

26. The active capacitor regulating type controllable voltage and current power supply circuit as in claims 22~25, wherein its multiple voltages output circuit includes two or more than two voltage stages designs, and its embodying principles include the following:

The voltage stages of the multiple voltage extractions distributing output circuit can be of two stages or more than two stages;

Same numbers of the controllable current distributing devices 105 can be installed according to voltage stages of the multiple voltage extraction distributing output, wherein their series combining points can be used for multiple voltage extraction output;

Same number of voltage control devices 106 can be installed according to voltage stages of the multiple voltage extraction distributing output to individually control the current distributing device 105;

A common output voltage control device can be installed to individually control the controllable current distributing devices 105.

27. The active capacitor regulating type controllable voltage and current power supply circuit as in claims 1~26, wherein its single voltage output circuits or multiple voltage extractions output circuits are constituted by that the controllable current

distributing device 105 can be controlled by the output voltage control device 106 in the following control circuit embodiment types including fixed bias, or proportional bias, or phase angle triggering modulation, etc. Whereby a primary voltage stabilizing circuit between the output voltages can be omitted allowing the circuit to react with the output voltage variations.

28. The active capacitor regulating type controllable voltage and current power supply circuit as in claims 1~26, wherein its single voltage output circuits or multiple voltage extractions output circuits are constituted by that the controllable current distributing device 105 can be controlled by the output voltage control device 106 in the following control circuit embodiment types including fixed bias, or proportional bias, or phase angle triggering modulation, etc. Whereby a primary voltage stabilizing circuit can be installed between the output voltages to improve the control on the controllable current distributing device affected by the voltage variations.

29. The active capacitor regulating type controllable voltage and current power supply circuit as in claims 1~26, wherein its single voltage output circuits or multiple voltage extractions output circuits are constituted by that if the controllable current device 105 is controlled by the pulse-width output voltage control device CL110 for pulse-width modulation (PWM), the primary voltage stabilizing

circuit between the output voltages can be selected to be installed or not installed.

30. The active capacitor regulating type controllable voltage and current power supply circuit as in claims 1~26, wherein its single voltage output circuits or multiple voltage extractions output circuits are constituted by that the load side feedback signal is accepted by the output voltage control device 106 to control the current distributing device 105 for providing corresponding distributing current, thereby to control the terminal voltage or output current.

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